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Calculating FEV1, FVC and FEV1/FVC Ratio by Spirometric Reference Formula on Abdominal Obesity Subjects

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Abstract: ***World Health Organization (WHO) defines overweight and obesity as abnormal or excessive fat accumulation that presents a risk to health. [(1)] Height and age are the most important explanatory variables in Spirometric reference equations. Twenty subjects were selected. Pulmonary function was assessed by Spirometric Reference Equation Subjects were informed about the procedure, merits and demerits of the treatment. Consent is obtained from each subject for voluntary participation. The result shows that the FEV1, FVC and FEV1/FVC ratio are normal on abdominal Obesity subjects. But however, the mean values for boys is slightly higher than girls.***

Keywords: Abdominal obesity, Spirometric reference equation, Pulmonary function, Waist Circumference

1. Introduction

World Health Organization (WHO) defines overweight and obesity as abnormal or excessive fat accumulation that presents a risk to health. [(1).] Abnormality in the values of FEV_1, FVC and FEV_1/FVC was linked with the components of the metabolic syndrome, most importantly with abdominal obesity and with elevated low-density lipoproteins, hypertension, and insulin resistance. They were independent of age, sex, BMI, history of cardiovascular diseases, smoking, or alcohol use. In this research the PFT measurements were all restrictive lung pattern, which is usually seen in obesity-related lung changes. [(3)]

Abdominal adiposity markers like Waist Hip Ratio (WHR) and WC may influence pulmonary function through a mechanism that may restrict the descent of the diaphragm and limit lung expansion, compared to overall adiposity, which may compress the chest wall. [(4)] BMI and waist measurements are well recognized ways to characterize obesity However, waist measurements are better than BMI measurements for Abdominal Obesity. For this reason, it is recommended to use waist measurements. The absolute waist circumference is >102 cm (40 in) in men and >88 cm (35 in) in women. [(4)]

Height and age are the most important explanatory variables in Spirometric reference equations. [(8)] Guidelines for the measurement of Spirometric indices, aiming to maximise accuracy and precision, focus on equipment, measurement procedures and quality control. They do not, however, address the equally important issues of accurate height and age measurement. Recently, Spirometric reference equations have become available for Caucasians and other ethnic groups from childhood to old age, complete with accurate lower limits of normal. These all-age equations avoid the child–adult disjunction, and they inevitably highlight bias due the disjunction in other equations.

PREDICTED FEV1= Race x 1.08 x [(0.0395 x height) – (0.029 x age)-2.49)]

PREDICTED FVC = Race x 1.15 x [(0.0443 x Height) – (0.026 x Age) – 2.89]

The normal range of FEV_1 is between 3.0 and 5.0 and the normal value of FEV1/FVC ratio is above 0.75. Values lower the 0.70 are suggestive of airflow limitation with an Obstructive pattern whilst in restrictive lung diseases, this ratio is high. Race variables are 0.93 for Asian, 0.87 for black or African-American and 1 for white Caucasian.

Subjects and Methods:

The present clinical trial was conducted in Jaya College of Paramedical Sciences, College of Physiotherapy. The study contains both males and females patients above 18 years of age and willing to participate in the study. The purpose of the study was explained to all subjects and consent from each subject was obtained. The subjects were selected by measuring waist circumference. For the study, Twenty subjects were selected. Pulmonary function was assessed by Spirometric Reference Equation. Subjects were informed about the procedure, merits and demerits of the treatment. Consent is obtained from each subject for voluntary participation.

Statistical analysis

The Mean & Standard deviation for Continuous variables, namely FEV_1, FVC, FEV_1/FVC ratio can be measured. The mean value of FEV1 for boys is 3.555 and for girls is 3.371, $P = 0.9305 > 0.05$. The mean value of FVC for boys is 4.320 and for girls is 4.10, $P = 0.9319 > 0.05$. Finally, the mean value of FEV1/FVC ratio for boys is 0.823 and for girls is 0.822, $P = 0.7575 > 0.05$.

Values of Height, Weight, FEV1, FVC, FEV1/FVC ratio for Boys

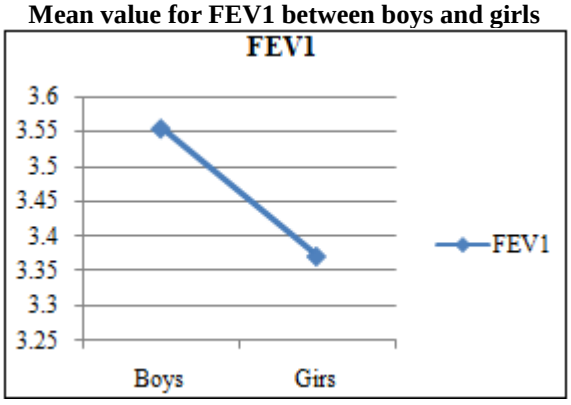
S. NO	Age	Height (cm)	Weight (kg)	Pulmonary Function		
				FEV1	FVC	FEV1/FVC Ratio
1	22	171	73	3.62036	4.399174	0.822963
2	23	167	68	3.436555	4.181852	0.821778
3	21	161	84	3.248732	3.953193	0.821799
4	21	174	77	3.764491	4.569118	0.823899
5	22	176	70	3.818729	4.636069	0.8237
6	20	168	72	3.551558	4.312652	0.823521
7	21	172	70	3.685144	4.47436	0.823614
8	24	167	73	3.411445	4.154045	0.821234
9	18	165	70	3.482757	4.226129	0.824101
10	24	170	112	3.530466	4.296182	0.821768

Values of Height, Weight, FEV1, FVC, FEV1/FVC ratio for Girls

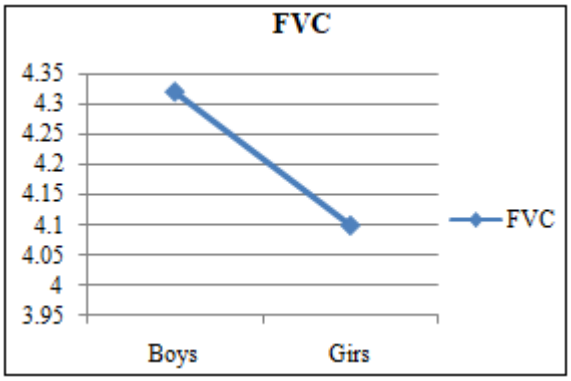
S. No.	Age	Height (cm)	Weight (kg)	Pulmonary Function		
				FEV1	FVC	FEV1/FVC Ratio
1	21	161	53	3.248732	3.953193	0.821799
2	21	168	71	3.526448	4.284845	0.823005
3	21	168	72	3.526448	4.284845	0.823005
4	19	161	67	3.298952	4.008807	0.822926
5	22	152	67	2.866558	3.498976	0.819256
6	21	168	57	3.526448	4.284845	0.823005
7	21	168	60	3.526448	4.284845	0.823005
8	22	173	70	3.699707	4.493932	0.823267
9	21	168	58	3.526448	4.284845	0.823005
10	21	154	61	2.971015	3.621541	0.820373

Mean values for boys and girls			
S. NO		BOYS (n=10)	GIRLS (n=10)
1	HEIGHT	1.691	1.641
2	WEIGHT	76.9	63.6
3	AGE	21.6	21
4	FEV1	3.555	3.371
5	FVC	4.3203	4.1001
6	FEV1/FVC RATIO	0.823	0.822

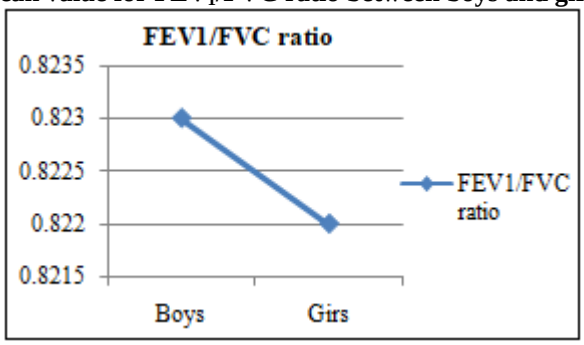
Mean value for FEV1 between boys and girls



Mean value for FVC between boys and girls



Mean value for FEV_1/FVC ratio between boys and girls



2. Results

The result shows that the FEV1, FVC and FEV1/FVC ratio are normal on abdominal Obesity subjects. But however, the mean values for boys is slightly higher than girls. Therefore, we conclude that pulmonary function may seen higher for boys than girls. Anyway, further studies may be needed for the Spirometric Reference Formula.

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